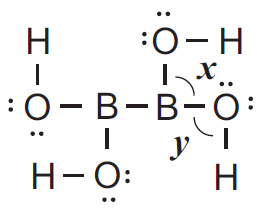
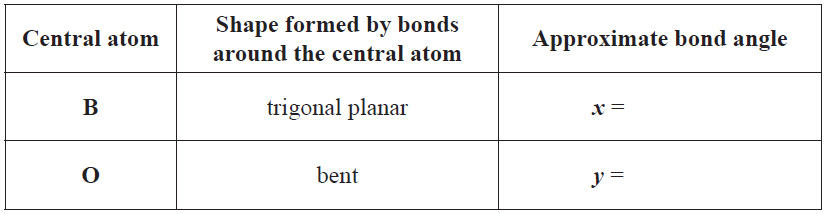
Describing and explaining shapes of molecules

**1)** The Lewis structure for a molecule containing atoms of boron, oxygen, and hydrogen, is shown below.



**i)** The following table describes the shapes around two of the atoms in the molecule above.

Complete the table with the approximate bond angles ***x*** and ***y***.



**ii)** The bond angles ***x*** and ***y*** in the molecule above are different. Elaborate on why the bond angles are

different. In your answer you should include:

• factors which determine the shape around the:

- **B** atom for bond angle ***x***

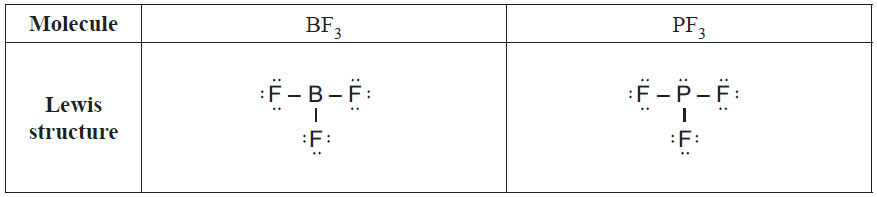
- **O** atom for bond angle ***y***

• reference to the arrangement of electrons around the **B** and **O** atoms.

**2)** Boron and phosphorus both bond with three fluorine atoms to form BF3 and PF3. However, the

molecules have different shapes and bond angles. The following table shows the Lewis structures for the

molecules BF3 and PF3.



Explain why these molecules have different shapes and bond angles.

In your answer include:

• the shapes of BF3 and PF3

• factors that determine the shape of each molecule

• the approximate bond angle in BF3 and PF3

• justification of your chosen bond angles for each molecule.

**3)** The following table shows the Lewis structures and bond angles for the molecules SO2 and H2CO.



Explain why these molecules have different shapes, but have the same approximate bond angle.

In your answer you should include:

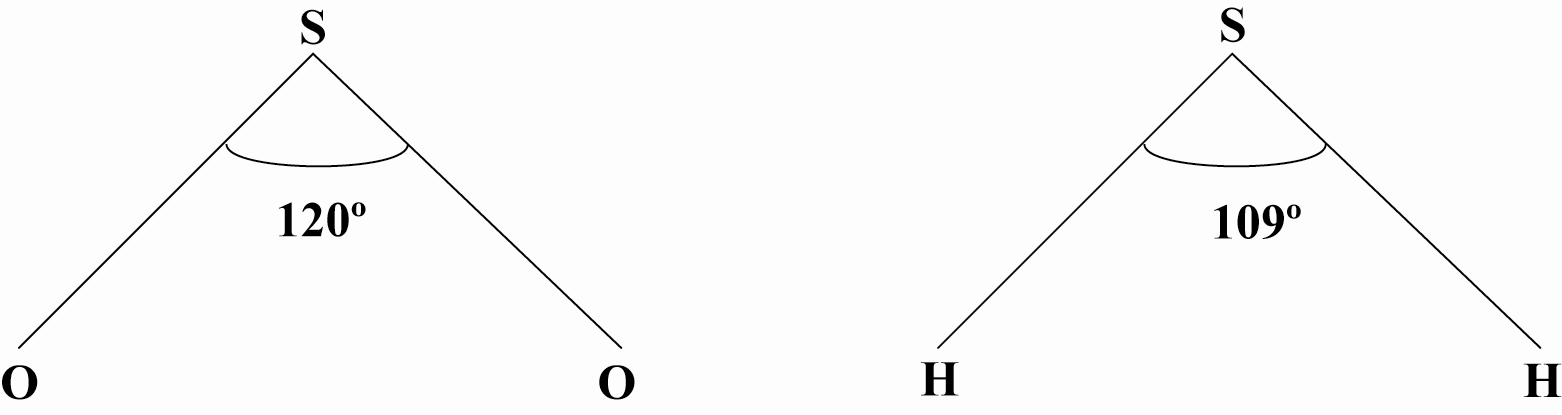
• the shapes of SO2 and H2CO

• factors which determine the shape of each molecule

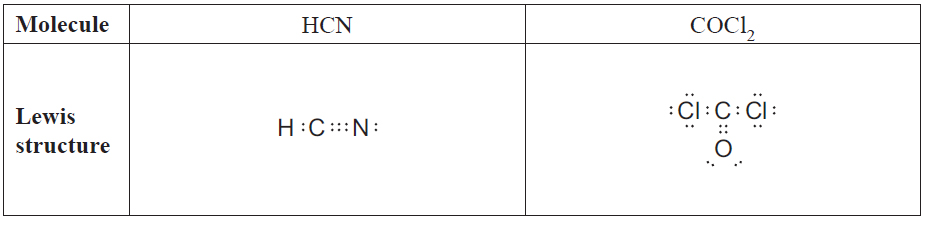
• an explanation of why the approximate bond angle is the same by referring to the arrangement of

electrons for each molecule.

**4)** The shapes of the two molecules SO2 and H2S are shown in the diagram below. The shape of both molecules is described as bent.



**5)** Lewis structures for two molecules are given below.



For each molecule, name the shape of the molecule and give a reason for your answer.

**6)**

|  |  |  |
| --- | --- | --- |
|  | **NOCl** | **H2S** |
| **Lewis structure** | **1.jpg** | **2.jpg** |
| **Name of shape** | **bent** | **bent** |

The shape of both molecules can be described as bent. However, these molecules do not have the same

bond angle. Discuss why these molecules have different bond angles.

Your answer must include:

• factors which determine the shape of each molecule

• the approximate bond angle for each molecule.

**7)** The Lewis structures of the molecules NCl3 and SO3 are given below.

|  |  |
| --- | --- |
|  |  |

Discuss the shapes and bond angles of these two molecules. For each molecule:

• name the shape

• determine the bond angle

• justify your answers.

**8)** Lewis structures for TWO molecules are given below. For each molecule:

• name the shape

• justify your answer.

|  |  |
| --- | --- |
|  |  |

**9)** For each of the molecules in the table, name the shape and explain why it has the shape you have identified.

(i) CH3Cl

(ii) NCl3

(iii) CH2O

**10)** Molecules of water (H2O) and ozone (O3) each contain 3 atoms and both the molecules are bent.

However, the bond angle in H2O is significantly smaller than the bond angle in O3.

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